United States Patent

[11] 3,573,395

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[21] Appl. No. **743,807**
[22] Filed **July 10, 1968**
[45] Patented **Apr. 6, 1971**

[54] **FIREPROOF ELECTRICAL ISOLATION SPEAKER**
2 Claims, 1 Drawing Fig.

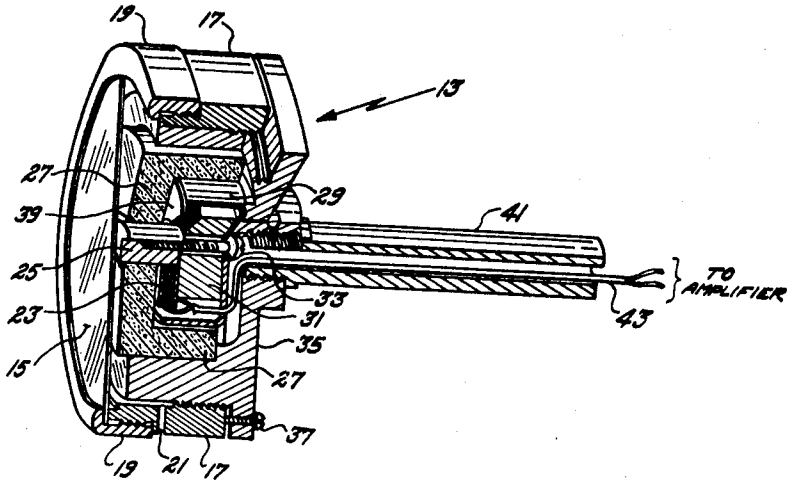
[52] **U.S. Cl.** **179/114,** 179/179
[51] **Int. Cl.** **H04r 13/02**
[50] **Field of Search** ..... 179/115.5 (BS); 340/9

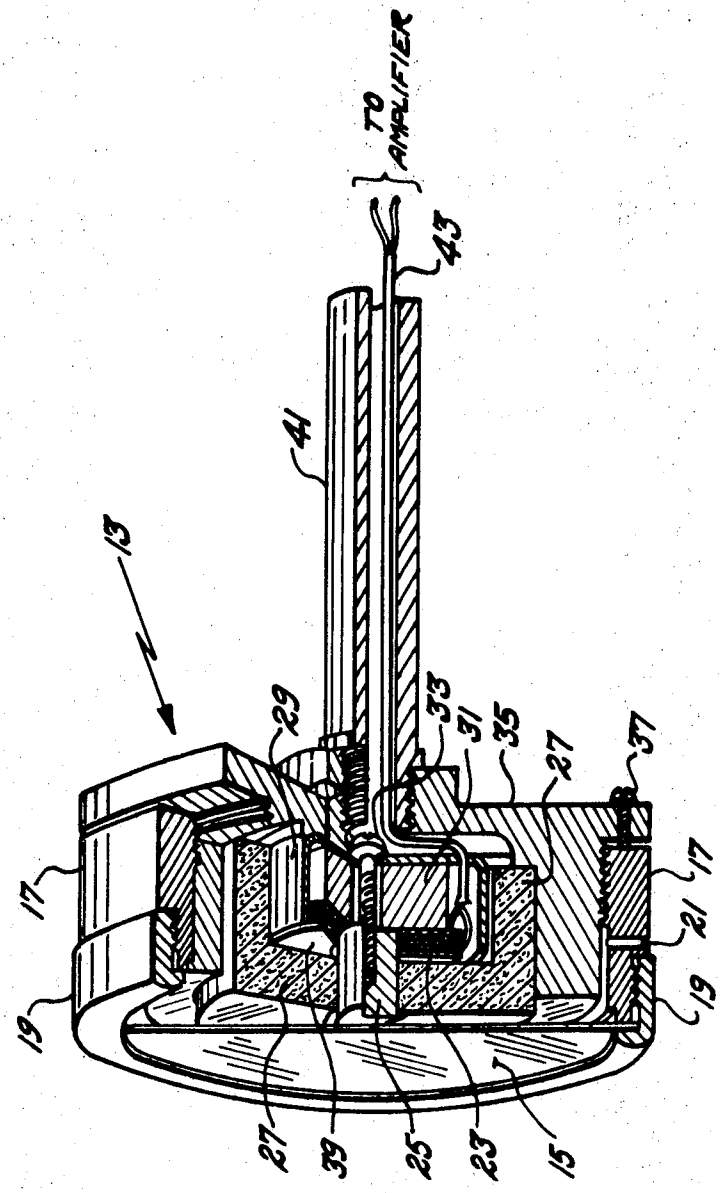
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ABSTRACT: A fireproof loudspeaker having a nonflammable sealing member positioned over the current carrying elements thereof to prevent possible spark or heat radiation from reaching the installation area by isolating the electrical elements while maintaining the speaker at substantially full magnetic efficiency.





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FIREPROOF ELECTRICAL ISOLATION SPEAKER

BACKGROUND OF THE INVENTION

This invention relates to loudspeakers and, more particularly, the invention is concerned with providing an improved communication speaker for use in volatile and high oxygen environments wherein the electrical components are isolated from the dangerous area to provide fireproof conditions.

Heretofore, in the communication systems used in volatile environments such as compression chambers in space capsules, the speakers and microphones utilized usually included burnable components in contact with the dangerous area. Also, the electrical coil and wires are directly in contact with or separated from the chamber environment by only these burnable components. This presently known arrangement creates a potentially explosive condition which is extremely dangerous to both personnel who may be in the area as well as to the equipment in which the communication system is installed.

This potentially hazardous situation could be controlled if all of the electrical components of the speaker were isolated from the chamber environment and if all of the components which come in contact therewith were constructed of nonburnable material. Further lessening of the danger would result if a mounting tube were provided through which the electrical wiring could be conducted to safe nonvolatile outside environment.

SUMMARY OF THE INVENTION

The present invention is primarily concerned with the provision of an electrical isolation speaker system which eliminates electrically conducting members in direct contact with the exposed environment of a chamber or area where volatile conditions are present. In the practice of the invention, normally flammable components are replaced by nonburnable components to provide a fireproof construction. An asbestos pressed seal provides complete electrical isolation by preventing the components from being exposed to the volatile environment. An iron core pressed through the heavy composition asbestos sealing plug transmits voice impulses from the coil magnetically to a metal diaphragm. A mounting tube provides an electrically isolated wiring channel to safe nonvolatile outside environment.

Accordingly, it is an object of the invention to provide a loudspeaker for use in a volatile environment wherein the electrical components are isolated from contact with the environment.

Another object of the invention is to provide a communication speaker which is fireproof and utilizes components which are manufactured from nonburnable materials.

Still another object of the invention is to provide an electrical isolation speaker which includes an asbestos isolation plug positioned between the coil and the diaphragm to prevent any electrically energized components from coming in contact with the chamber environment.

A further object of the invention is to provide a communication speaker which includes a mounting tube to allow installation on the chamber wall isolating the connecting wires to the outside and exposing only the speaker diaphragm to the internal chamber environment.

Another further object of the invention is to provide a fireproof speaker construction having a sealed unit wherein an iron core pressed through a heavy composition asbestos sealing plug transmits impulses from the voice coil magnetically to the metal diaphragm.

A still further object of the invention is to provide an electrical isolation speaker that acts both as a microphone as well as a speaker.

These and other objects, features and advantages will become more apparent after considering the description that follows taken in conjunction with the attached drawing and appended claims.

DESCRIPTION OF THE DRAWING

The drawing is a perspective view of a preferred embodiment of the invention partially cutaway to show the internal components of the fireproof speaker.

PREFERRED EMBODIMENT OF THE INVENTION

Although the utilization of the present invention is directed toward its use in chamber environments of high oxygen content such as space vehicles, it should be understood that equally effective use of the invention can be made in volatile and explosive atmospheric conditions.

The invention can, of course, be used under normal conditions in safe atmospheric areas as well as in the above described hazardous conditions. However, the primary utility of the hereinafter described fireproof speaker is for use in highly explosive and high oxygen content environments. Thus, the invention is particularly useful where these last-named conditions exist such as in space capsules having compression chambers which include highly volatile atmospheric environments.

Referring now to the drawing, there is shown an electrical isolation speaker according to the invention generally designated by the character reference **13**. The loudspeaker **13** includes a flat metal circular diaphragm **15** having edges held in position against a diaphragm adjustment ring **17** by the diaphragm retainer ring **19**. A vent hole **21** is provided in the diaphragm adjusting ring **17** to allow movement of the diaphragm **15** in response to impulses from the coil **23** which are transmitted magnetically by the iron core **25**. The coil **23** is separated from the diaphragm **15** by an isolation plug **27** fabricated of asbestos composition material and pressed over the iron cup **29** in which a permanent magnet **31** is positioned. The iron core **25** is pressed into the isolation plug **27** and held in position in the coil **23** by the retaining screw **33**.

The diaphragm adjustment ring **17** is threadably attached to a metal housing **35**. Rotation of the ring **17** relative to the housing **35** serves to increase or decrease the distance between the inner surface of the diaphragm **15** and the exposed end of the iron core **25**. A set screw **37** locks the two members from further relative movement when the proper diaphragm spacing is achieved. A phenolic disc **39** is positioned between the asbestos composition isolation plug **27** and the coil **23**. A mounting tube **41** having a speaker wire **43** passing therethrough is threadably connected to the metal housing **35** and serves to support the speaker assembly **13** as well as to carry the wires to the outside of the mounting structure.

In the electrical isolation speaker described, the electrical wire **43** and coil **23** do not come in contact with the chamber environment in which the speaker **13** is mounted. The compressed asbestos plug **27** isolates the electrical portion of the device by providing a pressed sealed unit allowing only the iron core **25** to transmit the magnetic impulses from the coil **23** to the diaphragm **15**. All of the components which contact the chamber environment are of nonburnable materials making the speaker completely fireproof and safe for use in volatile environments.

MODE OF OPERATION

The hereinbefore described fireproof electrical isolation speaker provides a simple and efficient solution to the problem of eliminating the extremely dangerous conditions which arise when electrical currents are passed into and through volatile environments. The device according to the present invention utilizes an asbestos pressed seal plug **27** to provide complete electrical isolation of exposed components, such as the coil **23**, to the volatile environment. Also, the mounting tube **41** provides an electrically isolated channel through which the wire **43** carries electrical current to and from the coil **23**.

In operation, the speaker **13** may be installed as part of a communication system in the wall of a compression chamber, such as in a space capsule, having a highly concentrated oxygen environment. Only the metal speaker diaphragm **15** is exposed to the internal chamber environment. The mounting tube **41** allows the safe installation of the speaker on the inside chamber wall by isolating the wires **43** passing to the outside. The asbestos isolation plug **27** prevents the electrical wire and coil **23** from being in contact with the chamber environment. This is accomplished by utilizing the asbestos isolation plug **27** as part of a pressed seal unit which includes an iron core **25** having the forward end thereof extending through the plug **27** to the area of the diaphragm **15**. The rearward end of the iron core **25** is disposed in the open center of the coil **23** and receives voice impulses therefrom which are magnetically transmitted to the metal diaphragm **15**. Thus, only magnetic impulses reach the diaphragm **15**, and, since all of the components are nonburnable material, the speaker **13** is completely safe in the volatile chamber environment.

Although the invention has been illustrated in the accompanying drawing and described in the foregoing specification in terms of a preferred embodiment thereof, the invention is not limited to this embodiment or to the particular configurations mentioned. It will be apparent to those skilled in the art that my invention can be used as a microphone as well as a speaker. Also, it should be understood that various changes, alterations, modifications, and substitutions, particularly with respect to the construction details, can be made in the arrangement of the several elements without departing from the true spirit and scope of the appended claims.

I claim:

1. A fireproof electrical isolation speaker comprising a resilient metal diaphragm for imparting sound impulses into the surrounding area, a diaphragm adjustment ring having a forward lip portion, a diaphragm retaining ring threadably attached to said diaphragm adjustment ring for fixedly holding the outer edge portion of said diaphragm against the lip portion of said diaphragm adjustment ring, a circular metal housing for containing elements of said speaker, said diaphragm adjustment ring being threadably attached to said housing, an annularly shaped permanent magnet centrally positioned in said housing, an iron cup disposed around the outer and lower surfaces of said magnet, an annular coil positioned on the upper surface of said magnet within the upper portion of said iron cup, a cylindrical iron core having one end located in the central opening of said annular coil, the other end of said iron core extending forward toward the inner surface of said diaphragm and spaced therefrom, said diaphragm adjustment ring having a vent hole through the wall thereof to prevent ambient pressure changes behind said diaphragm and allow freedom of lateral movement in response to magnetic impulses transmitted by said iron core, and an isolation plug fixedly positioned between said coil and said diaphragm and between the outer wall of said iron cup and said metal housing, said iron core being press fitted into said isolation plug and contacting the surface of said permanent magnet thereby magnetically transmitting the voice impulses received from said coil to said metal diaphragm.

2. The fireproof electrical isolation speaker defined in claim 1 wherein said isolation plug is fabricated of asbestos composition material.